The Mucous Glands of the Bile Ducts and Gall Bladder

By BAYARD HOLMES, M.D.,
Chicago, Ill.

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I.—ANATOMY, GROSS AND MICROSCOPIC.

IN the course of my treatment of some thirty cases of tachycardia and other diseases of the heart and circulatory apparatus, in which recovery has followed cholecytostomy, my attention has been called to the secreting mucous glands of the gall-bladder, the common duct, the hepatic duct and its branches and of the vasa aberrantia. The bile which has been removed from the gall-bladders of these patients has appeared to be sterile, and this has led me to look for other sources of the toxemia of which they suffered and recovered after the operation.

It is well known that there are certain glands of the body that appear in fetal life and grow with the development of the body and functionate to the very end of the individual's existence. There are other glands that appear at the same time, but outlive their functional usefulness and morphological development before or at birth and then gradually disappear; and there are still other glands that begin their existence late in life and serve their day during old age, or actually become a menace to existence. The prostate gland will be recalled as an apparent instance in the last category.

The mucous glands of the bile ducts, when they are thought of at all, are rarely placed in the category of the glands with functional or pathogenic secretions. Their position is questionable, and it is the purpose of this paper to present such evidence as the author's experience affords and the literature of the subject can be made to furnish, in order to elucidate the chemical

problems which the clinical cases referred to have called up in his mind.

For the convenience of presentation it is best to divide our thesis into the following sections:

1. The gross anatomy of the bile ducts as apart from the hepatic duct.
2. The minute anatomy of the bile ducts and gall-bladder, especially the minute anatomy of the mucosa and mucous glands.
3. The pathological significance of the bile ducts in general.
4. The relation between the mucous glands of the bile duct and the toxemias of cholecystitis and cholangitis.
5. The physiologic and pathologic significance of the secretions of the mucous glands of the bile duct in health and disease.

While the consideration of the latter part of this thesis is the most interesting, a study of the earlier problems is necessary to a proper understanding of the subject.

THE BILE DUCTS AND THEIR GLANDS.

The hepatico-biliary secreting apparatus consists of two distinct parts, the secreting cells of the liver on the one side, and on the other side the biliary ducts and their glands, which ducts connect the liver cells with the intestinal tract. These bile ducts are an anatomic and physiologic unit in themselves, and they must be kept wholly disconnected in the minds of the reader from the secreting substance of the liver from which they proceed and for which alone they are usually supposed to exist. We shall attempt to show that the bile ducts are a mass of glands secreting materials of a physiologic and pathologic importance.

The function of the liver cells is to secrete bile. This bile is perfectly liquid and absolutely free from cholesterin or cholesterol when it is passed into the primary bile duct. The material for this secretion comes entirely through the portal vein. In the bile, as it is secreted by the hepatic cells, there is absolutely none of that mucus-like substance which we are accustomed

to associate with the bile as it escapes into the intestine or is removed from the gall-bladder.

The first beginnings of the hepatic ducts are simple epithelial tubules, carrying the secretions from two or more hepatic cells onward to a larger duct. (Futterer, G.: Contributions to the Histology, Physiology and Pathology of the Liver, Bile Passages and Bile. *Medicine,* Detroit, 1898, vol. iv, pp. 460-896). These first ductules are simple epithelial tubules, with absolutely no recognizable connective tissue surroundings. A number of these ductules unite and form larger bile ducts, which at last concentrate in the hepatic duct. Ratzius (*Biologische Untersuchungen,* n. fol. iv, pp. 67-70, pl. 20-22) made a study of the primary ductules in the livers of a large number of animals and man, and concluded that these small ductules did not anastomose one with another. A sketch of his drawing of an injected section of the liver of a child is shown in Fig. 1.

The common duct and the larger hepatic ducts, as well as the cystic duct and the gall bladder, are provided with a muscular coat and a submucosa, in which there are extensive systems of blood-vessels, lymphatics and nerves. Their mucous membranes also are beset with glands.

MANY BILE DUCTS ANASTOMOSE.

It is extremely important that the inter-relation of the several bile ducts should be kept distinctly in mind. Kiernan asserted (*l. c.*, p. 730) that "if the left hepatic duct be injected with size or mercury, the injection will return by the right duct without extravasation." This shows how complete the anastomosis must be. While the primary ductules, as shown by Ratzius (Fig. 1), do not anastomose, the larger ducts do not form a perfectly dichotomous system, like the rivers of an elevated basin, whose waters concentrate from brook to river into one trunk, but the bile ducts communicate one with another in a somewhat irregular manner, as Sappey has shown in a beautiful drawing by Lackerbauer of an injected bile duct and its branches (*Traité d'Anatomie Descriptive*, 4me édition, vol. iv, p. 203,

fig. 825). This drawing (Fig. 2) shows how the general dichotomous arrangement of the bile ducts is modified by a system of communication, somewhat like the bayous of the delta of the Mississippi. This arrangement, we shall later try to show, is of great pathological and clinical significance.

THE GALL-BLADDER AND CYSTIC DUCT.

Near the termination of the hepatic duct there is an accessory biliary tract known as the gall-bladder and cystic duct. The gross anatomy of the gall-bladder

FIG. 1.—A drawing from a section of a child's liver, the bile ductules of which had been injected. The irregular circles are blood-vessels. This is from Ratzius' Plate 22, Fig. 9. It shows that the ductules do not anastomose.

has been well presented by all anatomists, from Heister and Bianchi to Sudler and Hendrickson. (The Architecture of the Gall-Bladder. *Johns Hopkins Hospital Bulletin,* vol. xii, pp. 126-129, 2 plates; and "A Study of the Musculature of the Entire Extra-Hepatic Biliary System," etc., *Johns Hopkins Hospital Bulletin,* 1898, vol. ix, p. 221 *et seq.* [Bibliography.]) I shall refer readers to these articles, or to their memory of them, except in relation to the mucosa and the microscopic anatomy of the mucous glands, the function of which forms the basis of this essay.

THE VASA ABERRANTIA.

Connected with the bile ducts proper, there is a system of accessory ducts which have received scant an-

atomic and pathologic consideration in recent literature and are almost never referred to in clinical medicine. These are the vasa aberrantia hepatis, or vaginal bile ducts of the liver. These ducts are either of vestigial embryonal origin, or they appear in the process of post-natal atrophy affecting a portion of the liver. Sappey (*l. c.*, p. 306) gives a full, clear and I believe accurate account of these canals, which I will produce at length:

"At certain points on the surface of the liver, we sometimes see the lobules atrophy little by little, then completely disappear and thus leave the corresponding bile ducts which, on the contrary, become the seat of a remarkable hypertrophy. The term *vasa aberrantia* is applied to the ducts thus exposed and hypertrophied.

"It seems that the hepatic cells of the lobules of which the vasa form parts abandon, so to speak, the vital processes belonging to them. Hence, these *vasa aberrantia* of the liver are the result of an hypertrophy of the corresponding ductules. They do not seem to exist in the fetus or in the infant. Up to the present, at least, I (Sappey) have not been able to discover them in these stages of life, but it is not rare to observe them at one or several points of the adult liver and they are still more frequent in the aged.

"The atrophy which precedes the appearance of the *vasa aberrantia* is sometimes the effect of long-continued compression of this or that portion of the gland. I was able to observe a well-marked example in a man of forty-five, in whom the costal arch on account of a deformity of the thorax, had produced a large transverse groove on the upper surface of the liver; throughout the whole extent of this groove we found not only the bile ducts exposed by atrophy of the neighboring lobules, but the division of the portal vein running to these same lobules had been transformed into fibrous cords. Generally, the disappearance of the lobules takes place without apparent cause. In such cases it takes place at certain circumscribed points, nearly always the same; most frequently at the two extremities of the liver, at the attachment of the lateral ligaments. They are also seen, though much more rarely, at the attachment of the suspensory ligaments or on the sharp border of the gland. The *vasa aberrantia,* nine times out of ten, are seen on the he-

patic border of the lateral ligaments, especially the left one. They are, for the most part, subject to frequent variations, but they also have certain characteristics in common which enable them to be recognized without difficulty. These characteristics are as follows:

Fig. 2.—A sketch from a drawing of an injection of a bile-duct somewhat reduced. It shows the general dichotomy of the large bile ducts and the tendency of the smaller ducts to a bayou-like leaving and returning to the adjoining canals. It also shows the numerous bud-like processes for the mucous glands. (Sappey's Fig. 825 l. c.)

"(1) They all communicate with the biliary ducts, so that they are injected on filling the latter.

"(2) Like the biliary ducts they assume a yellowish hue *post mortem*, though not so deep.

"(3) Like the biliary ducts they are composed of an epithelial and of a fibrous layer; however, the fibrous

layer is considerably thicker than that of the biliary duct which forms their continuations As the lobules from which they originate atrophy, the *vasa aberrantia* hypertrophy and the older they are the more they increase in thickness.

"(4) The mucous glands annexed to their walls also participate in their hypertrophy, but always become deformed, sometimes so much so that they are recognized with difficulty. In their primitive state the *vasa aberrantia* represent for the most part the first radicals of the biliary duct and show on their contour merely some urticular glands. Fig. III, B. In some cases these glands are rather regularly shaped. This condition is seen where the vasa are very small and but little hypertrophied, that is to say, in the vasa of recent origin. When, on the contrary, they are old and thickened, the dependent glands assume the most diversified aspect. In some cases they are large ovoid or spherical utricles, more or less deformed. Fig. III, A. At other times, and more frequently, they are utricles with an unequal or rugose surface. Fig. III. D. As many livers, so many varieties; in short, one might almost sey as many *vasa aberrantia* on the same liver or on the same portion of the liver, so many different aspects of their glands which have nothing constant save their existence.

"(5) Lastly, at certain points these canaliculi anastomose with each other and these anastomoses, while very variable in their arrangement, do not differ materially from those of the biliary duct. (Fig. II.)

"It results from these characters that the *vasa aberrantia* evidently form a dependent of the excretory duct of the liver, being merely more or less altered in form.

"The *vasa aberrantia* are not confined to man. I have been able to discover them also in the horse and ox. In two examples from these animals they occupied the hepatic border of the left lateral ligaments, anastomosing by their terminal extremity and forming a series of very irregular arches."

Sabotta (*Atlas and Text-Book of Anatomy*, Saunders, Philadelphia, 1906, vol. 2, p. 61) speaks of the liver substance as terminating in a fibrous appendix in which are found *vasa aberrantia hepatis*, blind bile ducts and their ramifications, structures which also

occur in other portions of the liver, particularly in the fibrous capsules beneath the peritoneal coat and in the ligaments of the vena cava.

Rauber (*Lehrbuch der Anatomie des Menchen,* Leipsic, 1907, seventh edition, Abt. 4, p. 123, Fig. 149) refers to the *vasa aberrantia* as a network of bile ducts which lie outside the liver substance. He speaks of

B A D

FIG. 3.—These are drawings of injections of the vasa aberrantia, A, B, D from Sappey's Fig. 828, l. c., and E from Toldt.

them as biliary tracts without contributing hepatic glandular parenchyma and attributes them to remnants of embryonal portion of the liver that never developed further or to a portion of the liver that was arrested in its present condition. He describes them as ducts lined with cylindrical epithelium and provided with a connective tissue matrix in which are located mucous glands. These ducts frequently contain little yellow

masses and they communicate not only with the hepatic duct but with the common duct and the cystic duct itself.

The earliest description of the vasa aberrantia is that of Frederic Ruysch (*Thesaurus Anatomicus Decimus, Amsterdam*, 1716, p. 71, No. clxxxi, Tab. III, Fig. v. See Figure IV.) This work is in Latin and

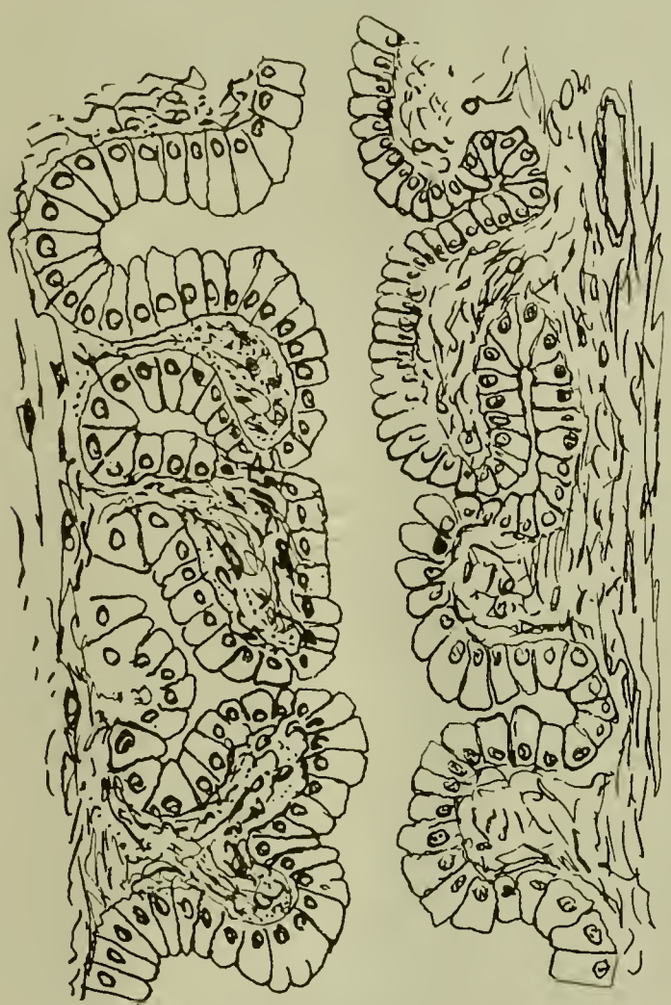

Fig. 3, E—A portion of the vasa aberrentia, with numerous glands.

Dutch in parallel columns and describes specimens in his museum:

"No. clxxxi, Capsula quadrata ex ligno Juglandino, et in illa magna portio Membranæ, quæ Hepar ambit; per eam disseminantur Arteriae repletae, et tanto quidem numero, ut satis mirari haud potuerim: circa illarum ultimas extremitates peculiare quid reperio, id quod sculptor, cælo suo, representare vix ad ne vix quidem potuit. Illud autem in conspectum non venit, nisi subjectum à latere perlustretur et quidem cælo sereno existente aut in radiis solaribus. Olim, dictam

Membranam in Epist. Anat. Probl. dilineari curavi, cum suis Arteriolis, enim vero quanta differentia est inter illam, et hanc exhibitam figuram Vid. Tab. III, F. v. Illo tempore guadio afficiebat, cum artificio peculiare de tegerem dictas Arteriolas quas nunquam videram ab aliis mihi esse demonstratas, multo minus minus per figuras exhibitas, nunc vero in hoc Thesaur. X, non solum illas, demonstro tanto numero, verum etiam peculiari extremitatum tenuatate."

Morgagni does not refer to the vasa aberrantia, though certain references would lead one to think he had observed them. He does not even mention the

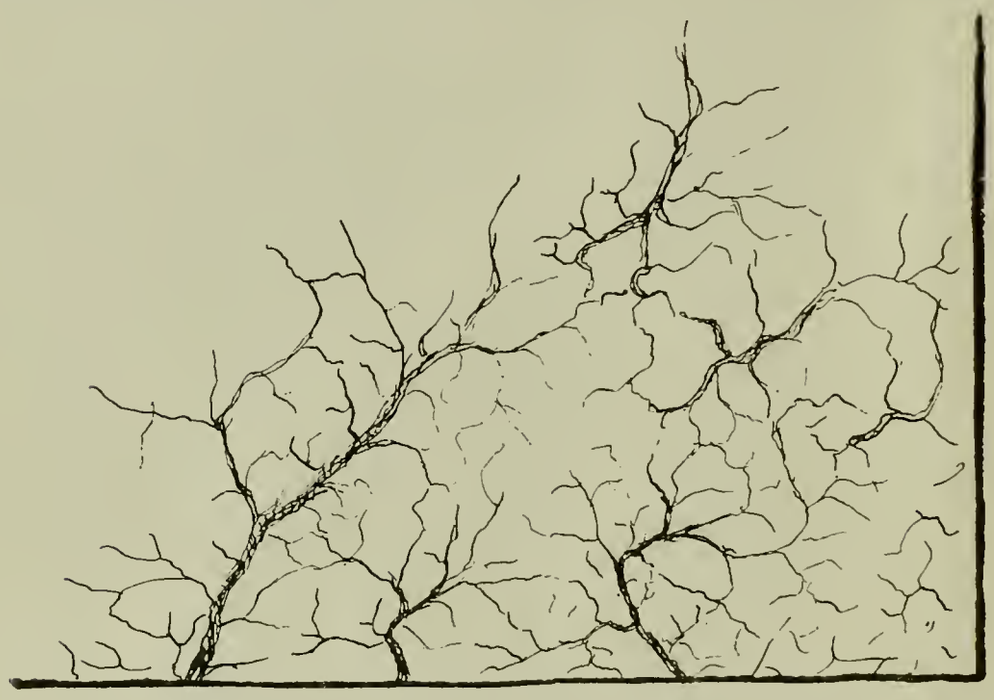

Fig. 4.—A corner of a drawing on copper of the vasa aberrantia, from Ruysch, l. c., 1715. Tab. III, Fig. 5.

glands in the cystic duct or gall-bladder. (*Animadvertones Anatomica Omnia,* 1723, III, p. 57, etc.).

The next reference to the vasa aberrantia is that of Ferren (Ferrein?). His publication was in the *Histoire de l'Academie Royal des Sciences*, Ann. MDCCIII, Paris, 1735, p. 37. He did not determine their endings and connections:

"A l'égard des Vaisseaux Biliaires, M. Ferren, en a observé de nouveaux, dont les uns reviennent du Ligament gauche du Foye, et qu'il a vus quelquefois répandus sur le face inférieure du Diaphragme, d'autres reviennent de cette portion des parois de le

Veine-cave qui paroit hors de l'échancrure Sigmoide du Foye quand on le regarde par derriére, d'autres enfin reviennent des Membranes de la Vésicule du Fiel. Tous ces Vaisseaux Biliaires pénétrent ensuite le Foye, et aboutissent dans les Canaux Hépatiques. Les injections colorées, pousées dans le Tronc des Conduits Hépatiques, donnent la facilité de les observer."

Francis Kiernan in his most elaborate article, "The Anatomy and Physiology of the Liver," which was published in the *Transactions of the Royal Phili-*

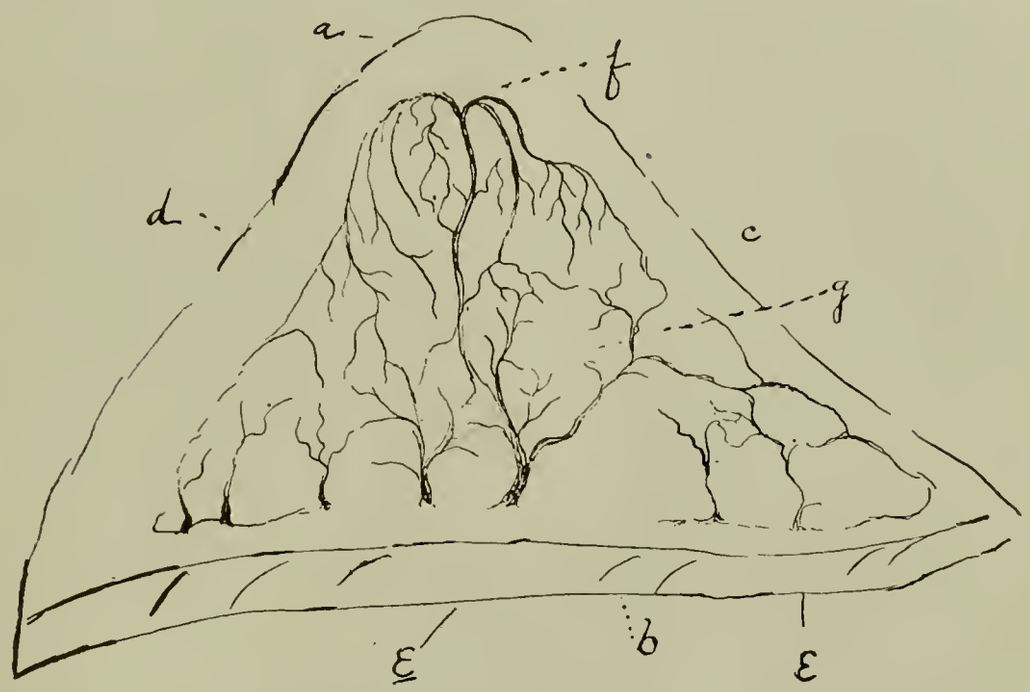

FIG. 5.—This sketch is from a beautiful copper-plate engraving in Kiernan's article, being plate 23, opposite page 728, Proceedings of the Royal Philosophical Society, 1833. *a*, The left lateral ligament of the liver; *b*, the posterior edge of the left lobe of the liver; *c*, the loose edge of the ligament; *d*, the edge of the ligament which is connected to the diaphragm; *e*, biliary ducts emerging from the liver; *f*, arches; *g*, plexuses anastomosing.

sophical Society in 1833 (pp. 711-770), gives the first careful study of the whole system of the *vasa aberrantia* which is accessible to me. A portion of this description is copied herewith, beginning on page 742:

"The left lateral ligament may be considered as a redimental liver in which this organ presents itself to our examination in its simplest form. From that edge of the liver connected to the ligament, numerous ducts emerge, which ramify between the two layers of peritoneum of which the ligament is composed. These ducts were discovered by Ferrein (Ferren?), but this

anatomist did not ascertain their termination. 'A l'égard des vaisseaux biliaires, M. Ferrein en a observés de nouveaux, dont les uns reviennent du ligament gauche du foye, et qu'il a vus quelquefois repandus sur le face inférieure du diaphragma.'

"These ducts, the smallest of which are very tortuous in their course, divide, subdivide and anastomose with each other. They are sometimes exceedingly numerous, two or three of them in such cases being of considerable size; some of them, as Ferrien says, frequently extend to the diaphragm, and ramify on its inferior surface. They sometimes extend only halfway up the ligament, where they divide into branches,

Fig. 6.—A sketch of a drawing of one of the injection preparations of a mucous gland of the gall-bladder. From Lnschka, Anatomie des Menschen, ii, 1863, p. 256.

which, forming arches, return and descend toward the liver, anastomosing, or being continuous with other ducts issuing from it. The spaces between the larger or excreting ducts are occupied by plexuses of minute or secondary ducts (Plate XXIII, Fig 4. See Fig. V). I have injected the ducts on the inferior surface of the diaphragm, but have not succeeded in injecting them to their termination; we may, however, conclude that like those just described they form arches, the branches returning toward the ligament, and being continuous with others ascending from it. . . . . The umbilical

vein is also contained in a fissure of the liver which is frequently converted into a canal by a process of the liver called the *pons hepatis*, extending from *lobulus quadratus* to the left lobe; sometimes the two lobes are connected by a band only, which is similar in structure to that behind the cava. No ducts ramify in the coats of the gall bladder. It is probable that Ferrein mistook the absorbents of the gall bladder for ducts, this anatomist probably having injected some of the former vessels as I have frequently done, from the hepatic duct; or Ferrein may allude to ducts which occasionally ramify between the liver and gall bladder and divide into interlobular branches, which enter the former and which he may have removed with the latter

FIG. 7.—Longitudinal and transverse sections of the cells of a mucus gland of the gall-bladder. (After Shikinami.)

and mistaken for ducts ramifying upon it. No branches of the hepatic veins ramify in the coats of the gall bladder; and the absence of these vessels sufficiently proves the non-existence of ducts. The cystic veins are branches of the abdominal portal, and not of the hepatic portal or umbilical vein; they are therefore efferent, and not afferent, vessels, conveying blood from, and not to, the gall bladder: it necessarily follows that biliar ducts ramifying on parietes of this receptacle would obtain the material of secretion from arterial blood—that of the cystic arteries. If in any case ducts should be found on the gall bladder, I venture to assert that branches of both the portal and hepatic veins will be found."

THE MINUTE ANATOMY OF THE MUCOUS MEMBRANE OF THE BILE DUCTS AND GLANDS.

We spoke of three natural divisions of the bile ducts, (a) the common duct, the hepatic ducts and the duct-

ules with all of their ramifications onward toward the liver cells, (b) the cystic duct and gall bladder, and (c) the *vasa aberrantia*. We are not interested at the present time in the minute anatomy of the peritoneal, the muscular, the fibrous coat, or in the peculiar form of union between the ductuals and the liver. The mucosa and the *mucous glands* are the object of our study. In some respects the description of the mucosa in one place is sufficient for all. We have already noticed in Sappey's account of the *vasa aberrantia* the presence of abundance of mucous glands in these canals and the further fact that they increase in number and size with the age of the individual. In a much greater degree the mucous glands which line the common duct, the gall bladder and the tributary ducts multiply and increase in size with age. They appear to be very small and few in number in early life and to increase gradually from adolescence to maturity. They then multiply with unknown rapidity and from unknown causes in old age. In the adult the common duct, the larger hepatic ducts and the cystic duct are lined with urticular and racemose glands which open in the mucosa and discharge their secretion into them. If one of these bile ducts is split open, the outlets can be seen in regular rows extending from one end of the canal to the other, and placed at marvelously regular intedvals. They are not scattered about irregularly over the interior of the duct. These same glands are found in all of the *vasa aberrentia* (see Fig. III, a, b, c, r, e). Many of these ducts of a *more branching* character occupy the cervical portion of the gall-bladder and the whole cystic duct. Luschka found only three to twenty of these large mucous glands in the gall-bladder. The glands themselves, especially those of the bile ducts, are simple masses of epithelial cells arranged about the short outlet, as shown in Fig. III, d. These epithelial cells are extremely long cylinders with a large nucleus at their base, and those of the gall-bladderat least have a cap or cuticula out of which the secretions pour into the cavity of the gland. These cells, if properly examined, are found to contain rows or blubbers of a liquid, but chystalline cholesterine, as shown by

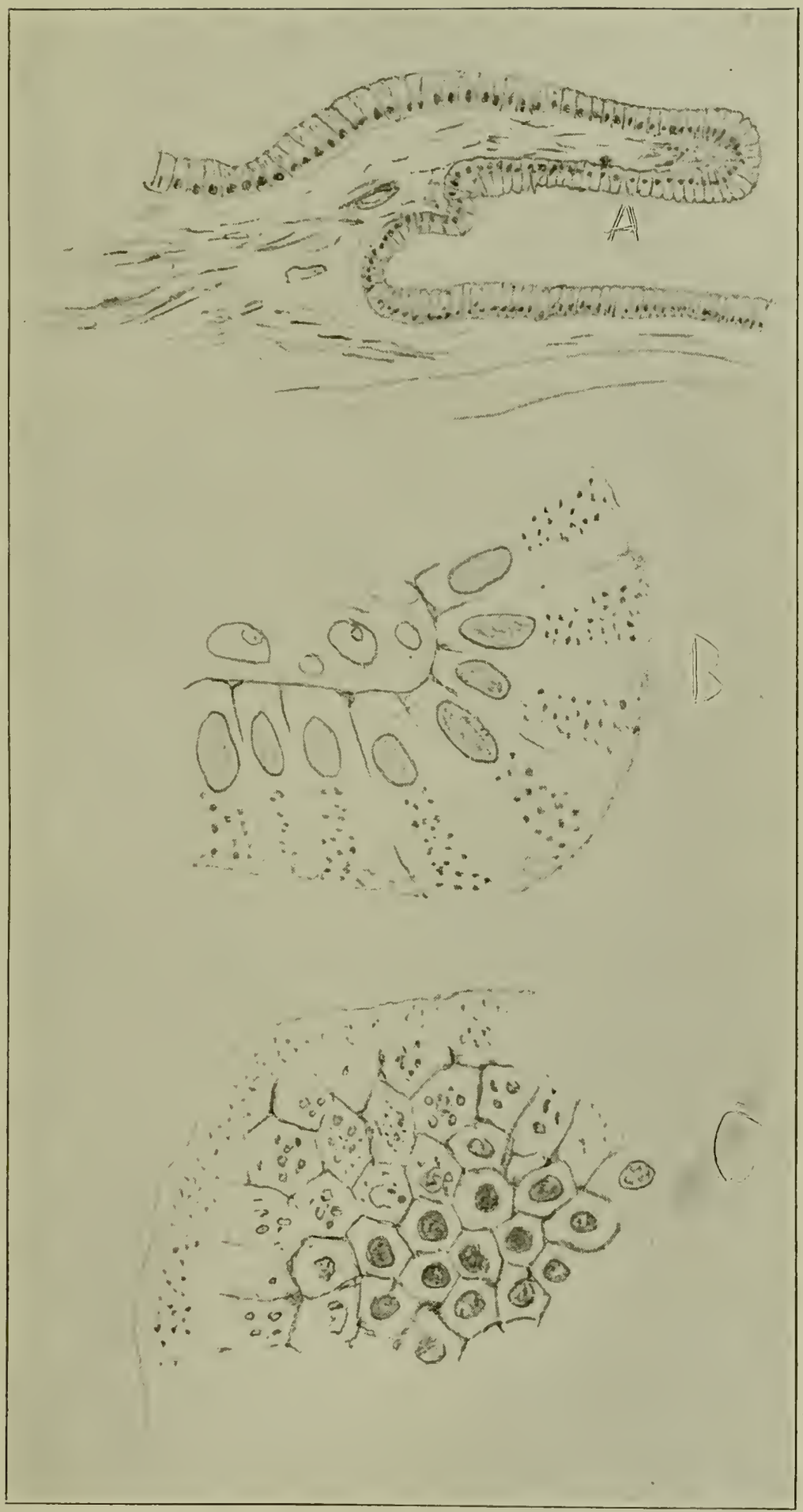

FIG. 8—Sommer's drawings of a gland of the gall-bladder.

the polariscope. These globules were noticed by Virchow, and have furnished a fruitful basis of argument and discussion. (Ueber Blut, Zellen und Fasern, *Virch. Arch.*, Bd. iii, 1851, pp. 228-248, and Bd. xi, 1857, p. 469.) The cuticula which covers the top of the cylindrical cell gives the appearance of cilia, and has been described by Shikinami (Beiträge zur mikroskopischen Anatomie der Gallenblase. *Anatomische Hefte* 36, pp. 555-598. Bibliography) and Sommers (*Die Epitheliolzellen der menschlichen Gallblase. Anatomischer Anzeiger,* 34, p. 148). The drawings made by Shiginami were from the mucous glands of the gall-bladder, and would indicate the presence

Fig. 9—Luschka's drawing of the outline of a mucous gland in the gall-bladder. *Zeitschrift f. rationalle Medizin,* 3rd series, vol. iv, p. 191 1858. This is the earliest picture of a mucous gland in the gall-bladder. These glands have sometimes been called Luschka's glands.

of a cilia (see Fig. VII, which is a sketch from Fig. 15, plate 44, and Fig. 16, plate 45, in his article referred to, p. ———.) Fig. 16 is a section across the top of a gland mass, showing upon the right hand side the nucleus; in the middle, the portion above the nuclei, and at the left the top of the cells or the cuticula. Fig. 15 shows the longitudinal section of the cylindrical cells, with their very large and active nuclei and the appearance of cilia. Shikinami gives a very careful discussion of the technique of his preparations and a choice bibliography of that phase of the subject.

Sommers (Die Epithelialzellen der menschlichen

Gallenblase, *Anatomische Anzeiger,* Band 34, p. 148) presents some very novel ideas in regard to the structure of the cuticula. His drawings are parallel with those of Shikinami. In my sketch a piece o fthe mucosa is represented, out of which a small portion is taken and highly magnified, and sections are made both parallel to the axis of the cylindrical cells and at right angles to this axis. Fig. VIII, subfigure (a) gives a section magnified about 200 diameters and reduced. This represents a gland presenting externally in the gall-bladder of a man thirty-three years old. Subfigure z shows a portion of the same gall-bladder epithelium much more highly magnified and again reduced. Subfigure c shows the cuticula beset with small particules of mucoid material. This drawing was highly magnified and reduced.

Sommers considers that the free end of the cells is covered with a perforated cap, like that of a pepper-box, out of the holes of which the secretion is forced in such form as to give the appearance of cilia, threads or droplets.

The most important matter relative to the mucous glands, outside of the character of their secretion, is their distribution. In the bile ducts, and in the *vasa aberrantia*, they are uniformly distributed from the ampula of Vater to the liver cells. In the cystic duct and the goll-blodder they not only take on a wholly different form, but they penetrate the muscular woll of the duct and gall-bladder. They ramify between bundles of muscle fibers and even protrude into the subserosa. Luschka (Die Drüsen der Gallenblase des Menschen. *Zeitschrift f. rationelle Medizin,* 1858, Bd. 4, dritte Reihe, p. 189) described these glands, and said that they were limited to nine to twenty in the gall-bladder, with a greater number in the cystic duct. He made a drawing from an injected gland, and Fig. IX is a sketch from Luschka's first picture. Luschka recognized the pathological and some of the signilcance of these glands, as we shall later show. The drawing which I have made represents this gland as it shows itself on section after having undergone some inflammatory changes (Fig. X). The number of

branches differs in different subjects, but as a rule they increase with the age of the patient. It may be a question whether the number of glands in the gall-bladder increases with age, or whether their multiplication is wholly due to infection or other disease. In the cystic duct the glands which are normally branching and racemose, are much more branching and penetrate farther into the surrounding tissue as life advanses.

A short historical account of the recognition of these

Fig. 10—A mucous gland of the gall-bladder, with some inflamation deep in the muscle, and extending toward the right in three or four places between muscles.

glands may not be out of place. The first notice of the glands which I rave been able to discover is that by Vicq d'Azyr. This seems to me of such ristorical interest that I will copy the whole article as it appeared in Moreau's "Œuvres de Vicq d'Azyr," vol. v, pp. 343-346, Paris, 1805:

SUR LES GLANDS DE LA VESICULE DU FIEL.

On sait que dans toutes les parties du corps humain, qui sont mouillées par un fluide âcre, ou qui peut le devenir, on trouve des glandes destinées à séparer une humeur glutineuse. Elles sont de la nature de celles qu'on appelle criptes ou

glandes passives, suivant le langage de M. Bordeu. Quelques-unes sont faciles à observer, telles que les buccales et les palatines; les autres sont peu considérables, et ne s'apercoivent que dans quelques circonstances et à l'aide de certains procédés.

Les glandes de la vésicule du fiel sont dans ce cas; elles sont plus marquées dans le bœuf, dans le cochon, et en général dans les quadrupèdes que dans l'homme. Les auteurs qui en ont donné des figures varient beaucoup sur leur volume. Ruysch les a annoncées dans la cinquième de ses Épitres, Figure III, et lorsqu'on les cherche dans cette figure, en les voit à peine. Bianchi, Tome II, Planche VIII, Figure III, les a representées plus considérable et comme des corps arrondis, désignés par autant de petits cercles. Suivant lui, elles sont placées sous la tunique nerveuse, et dans l'épaisseur de celle qu'il appelle glandineuse proprement dit, et qu'il dit etre transparente. Quoique Fanton et Santorini en aient parlé moins au long, cependant ce qu'ils en ont dit est exact; le dernier les a appelées du nom de *pori mucifori;* ce qui indique qu'il en connoisoit bien l'usage. Winslow les regardoit comme des lacunes, et il a remakqué, aprés plusieurs autres anatomistes, qu'elles sont plus rapprochées près du col de la vésicule. M. Lieutaud a dit le meme chose, et M. de Haller, auquel ces différentes autorités n'ont point échappé, a écrit qu'il y a des sujets dans lesquels on ne les apercoit point; mais que leur existence ayant été démontrée plusieurs fois, on ne doit point les nier, parce qu'il est difficile de les faire voir. Enfin, M. Sabatier a éprouvé les memes obstacles dans ce genre de dissection, et il a observé près du col de la vésicule plusieurs pores dont la membrane interne est percée, et qu'il a dit avoir pris pour des glandes.

Ayant injecté, avec les plus grandes précautions, pendent l'hiver dernier, plusieurs sujets, dans le dessein d'examiner les vaissaux et les glandes des intestins greles, je m'apercus que les membranes de la vésicule du fiel étoient épaissies et bien injectées. L'ayant ouverte, je vis avec plaisir de petites éminences entourées de vaisseaux, que je deconnus facilement pour les glandes de cette organe. Je les ai trouvées depuis sur un sujet qui avoit été injecté par M. Fragouard, dont les talens dans ce genre de préparation sont connus, et je les ai observées avec le microscope de Dellebare et avec differentes loupes. M. Fossier, dessinateur de la Société, les a vues ainsi que moi, et il les a dessinés dans deux différens états de grossissement, et telles qu'il les a observées lui-meme. It est essentiel de remarquer que le lentille de Dellebarre, no. 1, dont je me servi pour le seconde observation, produit un effet très-considérable. Quoiqu'elles paroissent plus nombreuses près du col, elles se trouvent cependant dans toute l'étendue de la surface interne; elles sont placées dans l'epaisseur de da membrane cellulaire qui soutient le réticulaire on villeuse. Leur consistance est assez ferme; elles sont arrondies et un peu allongées; leur grosseur naturelle approche de celle de la tete d'une très-petite épingle. J'ai apercu, avec une forte loupe, un petite orifice sur l'extremité de quelques-unes; il n'y a entr'elles aucune disposition symmétrique ou régulière, et en général elles sont distribuées le long des fibres qui semblent former le réseau de la membrane interne. Cette démonstration est en effet très-diffi-

cile à faire sur un grand nombre de sujets, et je ne dois pas oublier de dire que ceux dans lesquels je l'ai faite, n'ont offert, ni dans le foie ni dans la vèsicule, aucune trace quelconque de maladie.

Ces glandes sont la source de l'humeur muqueuse qui lubréfie les parois de la vésicule, qui s'amasse dans sa cavité lorsqu'un corps étranger, une squirosité ou une ligature ont interceпté le passage de la bile par le conduit cystique, et qui forme les concrétions différentes des calculs biliaires, en ce qu'elles ne surnagent point dans l'eau, et qu'elles ne sont point inflammables. Plusieurs auteurs ont admis une bile particulière filtrée dans ces glandes. Parmi les modernes, Van Swieten a surtout défendu cette opinion; mais le mucus dont nous avons parlé est le seul qui s'y sépare et qui la remplisse lorsque la bile du foie ne peut y parvenir. On voit quelquefois ces mêmes glandes obstruées et les membranes épaissies. Bennet en fournit un example frappant. Il trouva tout le col de la vésicule squirreux, et parsemé de petites tumeurs rondes, dans le cadavre d'un homme mort d'une maladie du foie. J'ai fait la meme remarque dans celui d'un melancolique mort à la suite d'une hydropisie.

Wedl, C. (*Sitzungsberichte der .k. Akademie,* iv. Band, 2. Abth., S. 480, 1850),recognized the mucous glands of the gall-bladder in men and animals, and this seems strange when we learn that he used a gall-bladder from a patient dead of typhoid fever and very poor methods.

Kölliker (*Mikroscopische Anatomie,* ii, S. 231, 1852), who published the first histology in the modern sense, concluded, after a thorough examination of two gall-bladders, that mucous glands were entirely absent in them in the healthy.

Gerlach, however (*Handbuch der Geweblehre,* 2. Aufl.,S. 345), found mucous glands in the gall-bladders, and says the so-called bile-duct glands are present in small numbers in the gall-bladder and cystic duct.

The more recent authors have described these glands, sometimes quite incorrectly, as simple folds of mucosa, sometimes following Luschka, and often using material of a quite pathologic nature. The bile stains the gall-bladder so rapidly after death, that many post-mortem changes have been described as normal coditions.

In the recent microscopical journals there have been several articles which consider the glands of the gall-bladder and cystic duct exhaustively. These will be referred to in subsequent sections of this article.